ATL24 Known Issues

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ATL24 product known issues can be categorized as data quality issues, user utility issues, or product parameterization. Each of these categories has several different facets that range in complexity of the problems and the possibility of a solution.

1 Data Quality

1.1 Classification Performance

The most notable issue with data quality will likely be the photon-classification accuracy, namely Class 40 false positives. Although the innovation of using an ensemble improves the classification over the individual algorithm approaches, there are still many locations where ATL24 is reporting bathymetry incorrectly. Certainly, the ensemble confidence score helps limit some of these false positives but there can be improvements. Table 1 provides a summary of the classification issues on version 1.0 of ATL24 and mentions possible solutions for future data releases.

Table 1. Known issues, reasons and possible solutions to ATL24 classification accuracy

Classification Issue	**Reason**	**Possible Solution**
Class 40 false negatives in deep water	Classification algorithms have been developed on shallow depth environments	Create new training data in locations with increase depth opportunities
Class 40 false positives for daylight granules	Solar background creates a different scenario of signal finding	Create a separate model pipeline for day and night granules
Class 40 false positives in water column	Turbidity, instrument response, fish and mermaids	Create training data with higher levels of noise (turbity and/or solar background)
Class 40 false positives in depths past extinction depth	High levels of noise within the entire vertical range window	Filter those class 40 points that have high vertical uncertainty values
Class 40 false positives in close proximity of sea surface	The ATL24 algorithms often mistake dynamic or highly reflective sea surface as bathymetry. The false positives are also often related to the instrument response signal (echo)	Filter by the ATL03 flag *return_source* where if the flag is (=3) it is predicted to be an echo

1.2 TPU Estimation

The uncertainty estimates from the ATL24 TPU model are currently optimistic when compared with outputs of empirical accuracy assessments. Improvements to the TPU model for uncertainty determination are in the works for a future ATL24 release.

1.3 EGM08 Geoid

The EGM08 geoid model used for computing ATL24 orthometric heights is outdated and contains errors.

1.4 Refraction Correction

The refractive index of water layer used in the ATL24 refraction correction is based on global, 0.25 degree resolution temperature and salinity datasets processed using the Quan-Fry equation Quan and Fry 1995. The current version of the refractive index layer uses only annual averages of salinity and temperature at each geographical location and does not currently account for temporal variability.

2 User Utility

2.1 Uncertainty Value

For the subaqueous photons, the uncertainty value on each photon is a combination of the uncertainty in ATL03 and the TPU model uncertainty. If the user would like to separate these values, the original ATL03 *sigma_h*, *sigma_lat*, the *index_ph* value can provide the link back to the original ATL03 photon's uncertainties.

2.2 Refraction Correction

For the subaqueous photons, the correction value applied from the index of refraction data layer can be removed by using the *index_ph* to link back to the original ATL03 photon's position.

3 Product Parameterization

3.1 Waves

Currently, there are no parameters on ATL24 related to wave characteristics derived from the sea surface photons.

3.2 Classification Confidence

When the value of the confidence is less than 0.6, the $low\_confidence = 1$. This threshold value will change with future iterations of ATL24.